Biological Robustness in Complex Environments (BRICS)

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> Proposers' Day Arlington, VA

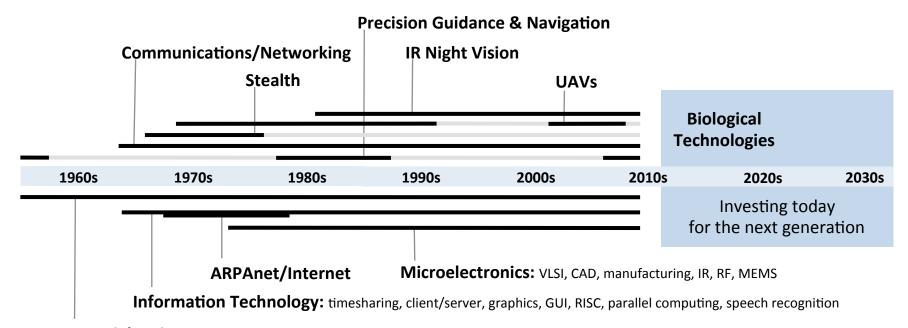
> > 8/21/2014





Mission:

Breakthrough Technologies for National Security

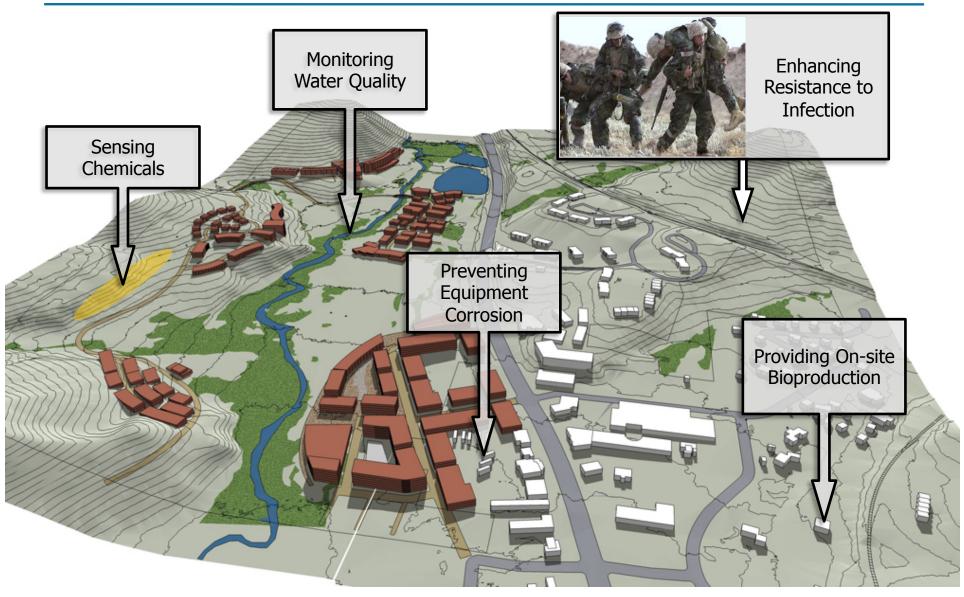


Materials Science: semiconductors, superalloys, carbon fibers, composites, thermoelectrics, ceramics

These new capabilities require a healthy ecosystem across Service S&T, universities, and industry DARPA's role: pivotal early investments that change what's possible



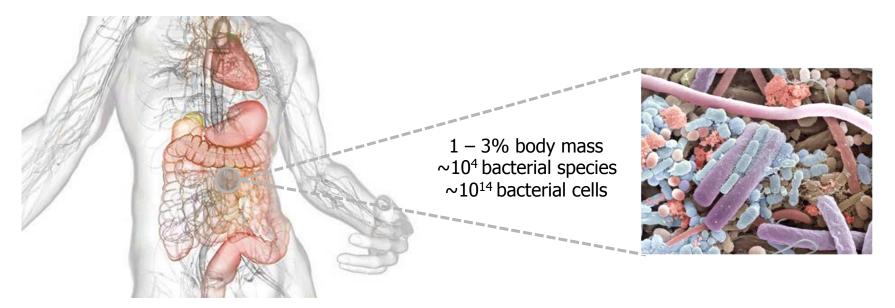
BRICS Will Develop Enabling Technologies





The Promise of Robust Engineered Biosystems

Engineered Communities that Maintain or Repair Normal Microbiota Functions



DoD Significance:

- 77% of warfighters in Iraq and 54% in Afghanistan had at least one bout with gastrointestinal disease because American gut microbiota are maladapted to new environments (Riddle et al. Am. J. Public Health 2008)
- 20% warfighters missed duty due to gastrointestinal disease during Operation Desert Shield (Hyams *et al.* NEJM 1991)
- Prophylactic engineered biosystems could be deployed stateside to increase readiness in theater

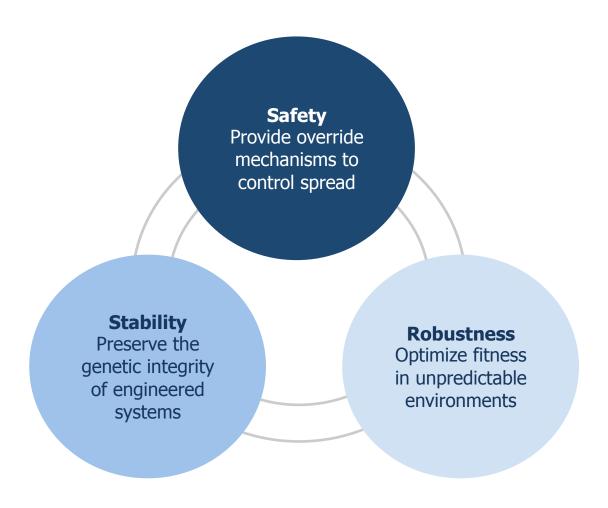


Impact of Robust Engineered Biosystems for Industry





BRICS Technology Could Lead to Reduced Costs for Industry by Sustaining Production and Minimizing Risks of Contamination





BRICS Aims to Build a New Scientific Community

Population Genetics

Optimize fitness and reduce genetic drift

Synthetic Biology

Design gene circuits with desired input/ output functions

Systems Biology

Balance system performance in dynamic environments

BRICS

Engineering

Optimize system performance and mitigate failure risk

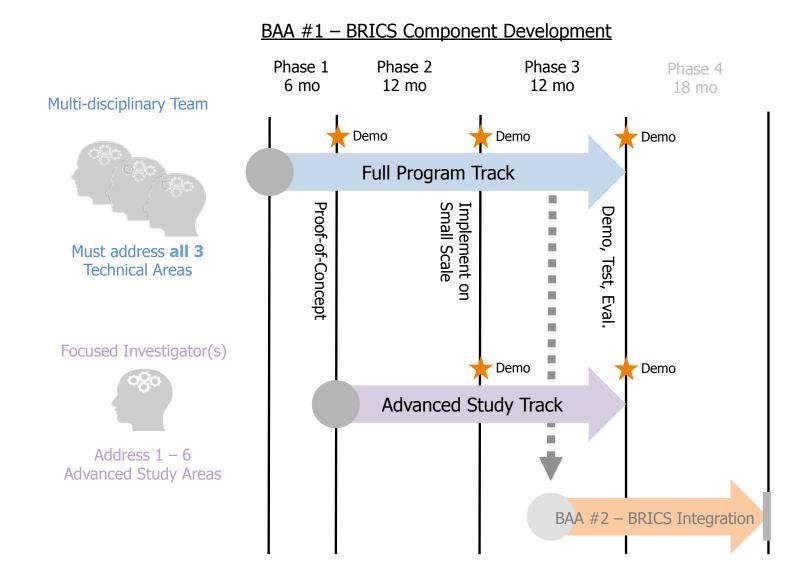
Ecology

Integration with local biological communities

All work must be conducted in fully contained systems.



BRICS Program Organization And Notional Schedule





Anticipated Proposer Schedule

